1. From the peripheral sensory nerve fibres, probably through a collateral thereof. (The direct reflex arc.)

2. From the cerebellum, which maintains a constant stimulation of the peripheral motor neuron, producing the necessary excitation.

3. From the cortico-spinal fibres, which have an inhibitory action, and thus counteract the other two exciting impulses. "Assuming all this to be the case, interruption of the cortico-spinal pyramidal fibres will give rise to exaggeration of the knee jerk by loss of the inhibitory influence. Interruption of the cerebello-spinal motor tract will cause absolute loss of the reflex, as the sensory stimulus coming from the tendon will be counteracted by the inhibitory action of the pyramidal fibres." JELLIFFE.

61. LE MÉCHANISME DES MOUVEMENTS REFLEXES (Mechanism of Reflex Movements). Van Gehuchten (Neurolog. Centralblatt, 16, 1897, p. 919; abst.).

The author presented this paper at the International Medical Congress of Moscow, an abstract of it appearing in the above mentioned journal.

A number of observers have shown that after complete transverse lesion of the cervical or dorsal region there is a complete loss of the tendon, skin and visceral reflexes, save perhaps the persistence of the plantar reflex upon deep needle puncture. According to our present physiological knowledge these facts are difficult of explanation.

The normal muscular tonus, according to Van Gehuchten, depends upon the condition of excitation which at any moment may be present in the cells of the anterior horns. This excitability depends upon the connecting fibres going to these cells: fibres from the posterior horns and from the cortex and cerebellum through the posterior longitudinal fasciculus.

Such fibres convey either *excitation* (posterior root fibres, intestinal and cerebellar fibres) or *impulses* (cortico-spinal fibres).

The normal muscular tone is thus dependent upon the *nervous* tone of the anterior horn cells, which is imparted to them by these two forms of stimulation, and any change in the nervous tone of these cells affects the muscle tonus. For the consummation of a voluntary movement it is not enough that the fibres from the motor zone to the muscles be intact, the cells in the anterior horns must have their normal nervous tone.

Thus a reflex motor act can occur only when:—

1. The reflex arc is both anatomically and physiologically intact.

2. When the motor cells have a normal nervous tone. Upon this second postulate depends the relationship of the intensity of the reflex act to the peripheral stimulation. Thus it is possible to understand why after the lesions of the pyramidal tracts exaggerated reflexes may be present, without the necessary theoretical assumptions of secondary degeneration or sclerosis of these fibre tracts.

Also it may be explained along some such hypothesis why reflexes may be lost after complete lesion of the cord without calling into account the nervous shock and inhibition fibres, according to Kahler and Pick, or to speak of a functional disturbance of the gray matter of the lumbo-sacral cord. VOGEL.

62. UEBER DIE LEITUNGSBAHNEN DER REFLEXE IM RÜCKENMARK UND DEN ORT DER REFLEXÜBERTRAGUNG (On the Conduction Paths of the Reflexes in the Spinal Cord and the Locality of the Reflex-Tranfer). J. Rosenthal and M. Mendelssohn (Neurolog. Centralblatt, 16, 1897, p. 21)

In contradiction of the accepted view that the short paths between the ingoing sensory fibres and the outgoing motor fibres are involved in the production of the phenomenon called the reflex, the authors have experimentally shown that in frogs and mammals the reflex-transfer takes place in the cervical portions of the spinal cord, and perhaps also partly in the medulla oblongata.

After having determined the minimum amount of the irritation just sufficient to produce a definite reflex, sections were made at different levels of the cord and the alterations noted. It was found that the integrity of the connection of the upper cervical cord, immediately beneath the calamus scriptorius, with the sensory and motor paths was indispensable for the production of the reflex. If this region of the cord be destroyed the former effective minimal stimuli no longer produce the reflex. If their strength be increased the stimuli find other paths to the origins of the motor nerves

It therefore appeared probable to the authors that in cases presenting lesions of the bulbo-cervical region the reflexes below would be either abolished or very much diminished. In diametrical opposition to this view was the teaching that separation of the cord from the medulla occasioned an exaggeration of the reflex.

At that time (1875) the only reported cases were those of Kadner, Weiss, Kahler and Pick, in which transverse injury in the upper cord caused abolition of the reflexes below the lesion. Since 1882, when the authors renewed their investigations, other cases were put on record in which complete transverse lesion of the cord was followed by flaccid paralysis of the lower extremities with abolition of the tendon, skin and visceral reflexes (Bastian, Bowlby, Thorburn, Babinski, Bruns, Gerhadt, Hitzig, Egger, Hoche, Habel, Van Gehuchten), in spite of absolute integrity, microscopically determined, of the lumbo-sacral regions of the cord.

Another significant fact is that in no case recorded of complete transverse division of the cord did the tendon, visceral and skin reflexes persist.

It appears therefore that the clinical observations are in accord with the experimental in placing the reflex centre in the bulbo-cervical portion of the cord. MEIROWITZ.

63. EXPERIMENTAL OBSERVATIONS ON THE CROSSED ADDUCTOR JERK. P. Stewart (Journal of Physiology, 22, 1897, p. 61).

As the result of the author's observations on a case in which the phenomenon of crossed knee jerks was obtained the following conclusions were offered:—

1. That the crossed adductor jerk is not due to direct stretching of the adductor muscles by a shock communicated to the pelvis.
2. That the crossed adductor jerk is not due to a shock mechanically transmitted to the spinal cord.
3. That the crossed adductor jerk is a true reflex, occurring at a period distinctly later than the ordinary knee jerk.
4. That the average time required for the appearance of the crossed adductor jerk is about .126 of a second from the time when the opposite tendon is tapped. JELLIFFE.

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64. NOTE ON MUSCLE-SPINDLES IN PSEUDO-HYPERTROPHIC PARALYSIS. A. S. Grünbaum (Brain, 20, 1897, p. 365).

The author gives a short note of his findings in a case of pseudohypertrophic paralysis. He says the muscle-spindles were for the most part unaffected, but in a few there was a diminution in size of an